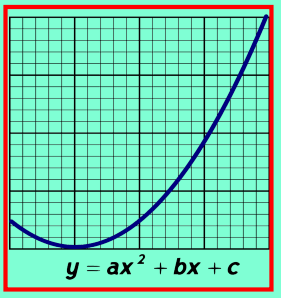
Math 125

Fall 2021

Lecture 13



Class QZ 10

$f(x) = x^2 - 3x + 9$ $\quad g(x) = x - 3$

Find

$f(-2) = (-2)^2 - 3(-2) + 9$
$= 4 + 6 + 9 = \boxed{19}$ ✓

$g(3) = 3 - 3$
$= \boxed{0}$ ✓

$(f \cdot g)(x) = f(x) \cdot g(x) = (x^2 - 3x + 9)(x - 3)$
$= x^3 - 3x^2 - 3x^2 + 9x + 9x - 27$
$= \boxed{x^3 - 6x^2 + 18x - 27}$ ✓

Suppose $A = \{3,4,5,9,10\}$

$B = \{5,6,7,8,9\}$

$C = \{2,6,8\}$

$A \cup B$

$= \{3,4,5,9,10,6,7,8\}$

$= \{3,4,5,6,7,8,9,10\}$

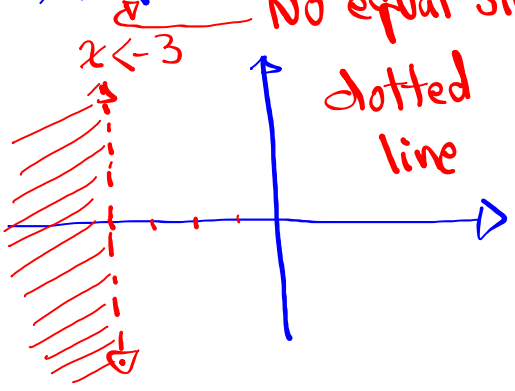
$= \{3,4,5,\ldots,10\}$

$A \cap C = \{\} = \phi$

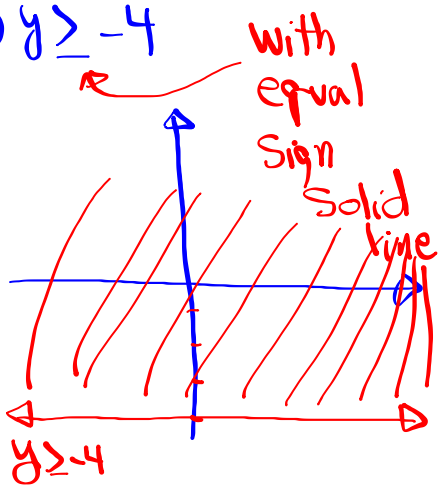
$B \cap C = \{6,8\}$

Graph & Shade

1) $x < -3$



2) $y \geq -4$



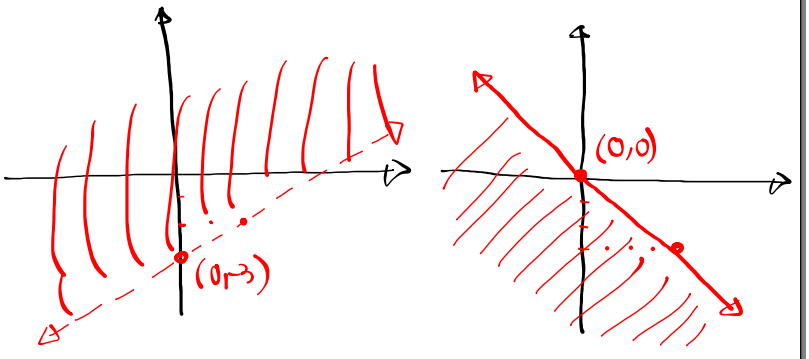
Graph & Shade

$y \geq \frac{1}{2}x - 3$

Dotted line
Shade above
Y-Int (0,-3)
Slope 1/2

$y \leq \frac{-3}{4}x$

Solid line
Shade below
Y-Int (0,0)
Slope -3/4



Graph & shade

$3x - 5y < 0$

Hint: write in Slope-Int. Form

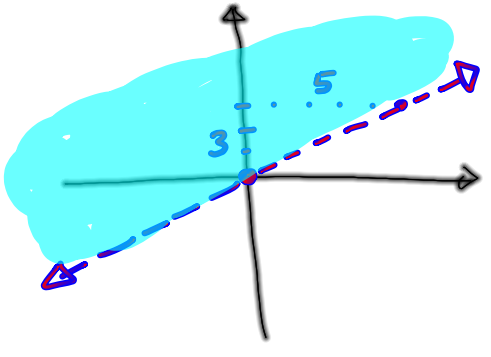
$-5y < -3x$

Divide by -5

$\frac{-5}{-5}y > \frac{-3}{-5}x$

$y > \frac{3}{5}x$

Dotted line, shade above, Y-Int (0,0)
Slope 3/5



Shade the Solution

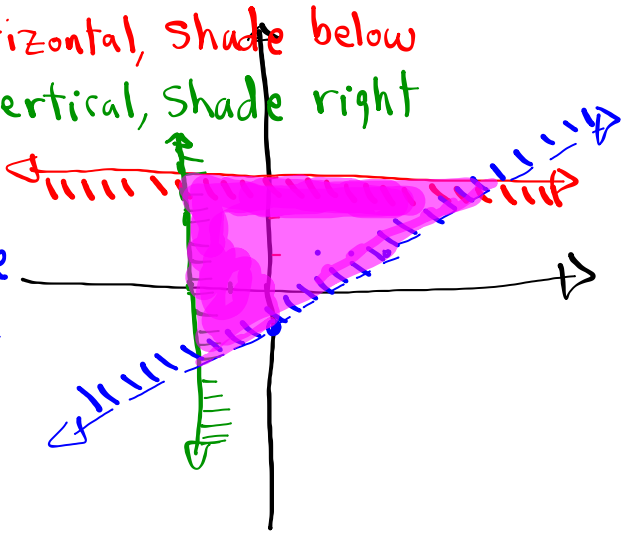
$$\begin{cases} y \le 3 \\ x \ge -2 \\ y > \frac{2}{3}x - 1 \end{cases}$$

$y \le 3$ Solid, Horizontal, Shade below

$x \ge -2$ Solid, Vertical, Shade right

dotted, shade above

Y-Int $(0, -1)$, $m = \frac{2}{3}$



Solve, give answer in all possible forms

$$-7 \le -2x + 3 < 7$$

$$-7 - 3 \le -2x + 3 - 3 < 7 - 3$$

$$-10 \le -2x < 4$$

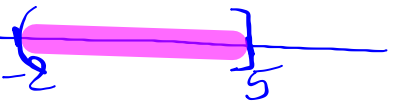
Divide by -2

$$\frac{-10}{-2} \ge \frac{-2}{-2}x > \frac{4}{-2}$$

$$5 \ge x > -2$$

$$-2 < x \le 5$$

Graphing



Set-Builder notation

$\{x \mid -2 < x \le 5\}$

Interval notation $(-2, 5]$

Absolute Value equation:

Type I : $|ax+b|=c$

No Solution if $c<0$

when $c \geq 0 \Rightarrow$ Solve

$ax+b=\pm c$

Final Answers in Solution Set

Solve

$|2x-1|=-5$

$ax+b$ c

Since $c=-5$, it is less than Zero, $c<0$

there is no solution

$\emptyset$

Solve $|2x-1|=5$

$2x-1=\pm 5$

$2x-1=5$ OR $2x-1=-5$

$2x=5+1$

$2x=6$

$x=3$

$2x=-5+1$

$2x=-4$

$x=-2$

$\{-2, 3\}$

Solve $|3x+5|=14$

$3x+5=14$ OR $3x+5=-14$

$3x=14-5$ $3x=-14-5$

$3x=9$ $3x=-19$

$\boxed{x=3}$ $\boxed{x=\frac{-19}{3}}$

$\left\{\frac{-19}{3}, 3\right\}$

Solve $|2x+7|-3=4$

Hint: Isolate the abs. value.

$|2x+7|=4+3$

$|2x+7|=7$

$2x+7=7$ $2x+7=-7$

$2x=7-7$ $2x=-7-7$

$2x=0$ $2x=-14$

$x=\frac{0}{2}$ $\boxed{x=0}$ $x=\frac{-14}{2}$ $\boxed{x=-7}$

$\{-7, 0\}$

Solve and Place Your answers on the number line System.

$|4x-8|=12$

$4x-8=12$ OR $4x-8=-12$

$4x=20$ $4x=-4$

$\boxed{x=5}$ $\boxed{x=-1}$

Solve

$-2|3x-1|+8=12$

Hint: Isolate the abs. value

$-2|3x-1|=12-8$

$-2|3x-1|=4$

Divide by -2

$\frac{-2}{-2}|3x-1|=\frac{4}{-2}$

$|3x-1|=-2$

Abs. value cannot be equal to a negative number.

NO Solution

$\emptyset$

Solve

$-3|x-5|+2=-13$

Always isolate the abs. value

$-3|x-5|=-13-2$

$-3|x-5|=-15$

Divide by -3

$\frac{-3}{-3}|x-5|=\frac{-15}{-3}$

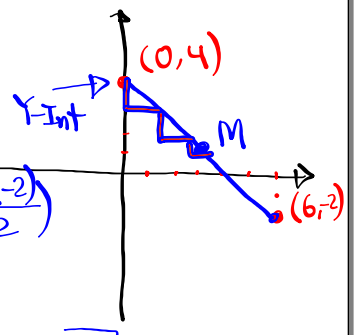
$|x-5|=5$

$x-5=5$ OR $x-5=-5$

$\boxed{x=10}$ $\boxed{x=0}$

$\{0,10\}$

$A(0,4)$ $B(6,-2)$



Draw $\overline{AB}$

Find midpoint $M\left(\frac{0+6}{2},\frac{4+(-2)}{2}\right)$

$=M(3,1)$

Find slope $m=\frac{4-(-2)}{0-6}=\frac{6}{-6}=\boxed{-1}$

Find distance $d=\sqrt{(0-6)^2+(4-(-2))^2}=\sqrt{6^2+(-6)^2}$

$=\sqrt{72}\approx\boxed{8.5}$

Find equation of $\overleftrightarrow{AB}$

$y=mx+b$

$y=-1x+4$

$\Rightarrow \boxed{y=-x+4}$

$f(x) = x+2$ $\quad g(x) = x+4$

Find

1) $f+g = x+2+x+4$

$= \boxed{2x+6}$

2) $f-g = x+2-(x+4)$

$= x+2-x-4$

$= \boxed{-2}$

3) $f \cdot g = (x+2)(x+4)$

$= x^2+4x+2x+8$

$= \boxed{x^2+6x+8}$

4) $f/g = \boxed{\frac{x+2}{x+4}}$; $x+4 \neq 0$, $\boxed{x \neq -4}$

$f(x) = \frac{x^3-8}{x^2-4}$

$f(0) = \frac{0^3-8}{0^2-4} = \frac{-8}{-4} = \boxed{2}$

$f(1) = \frac{1^3-8}{1^2-4} = \frac{1-8}{1-4} = \frac{-7}{-3} = \boxed{\frac{7}{3}}$

$f(2) = \frac{2^3-8}{2^2-4} = \frac{8-8}{4-4} = \frac{0}{0}$

Indeterminate

$f(-2) = \frac{(-2)^3-8}{(-2)^2-4} = \frac{-8-8}{4-4} = \frac{-16}{0}$

undefined

Discuss domain

Denom. $\neq 0$

$x^2-4 \neq 0$ → $x^2 \neq 4$

$\boxed{x \neq \pm 2}$

$-\infty$ $\quad -2$ $\quad 2$ $\quad \infty$

$(-\infty,-2) \cup (-2,2) \cup (2,\infty)$